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#### Abstract of the Disclosure

A CMP apparatus and process sequence. The CMP apparatus includes multiple polishing pads or belts and an in-line metrology tool which is interposed between adjacent polishing pads or belts in the apparatus. A material layer on each of multiple wafers is successively polished on the polishing pads or belts. The metrology tool is used to measure the thickness of a material layer being polished on each of successive wafers in a lot prior to the final polishing step, in order to precisely polish the layer to a desired target thickness at the final polishing step. This renders unnecessary an additional process cycle to polish the layer on each wafer to the desired target thickness. The metrology tool may be modularized as a unit with the polishing pads or belts.